

COMMENTARY

Reopening of a school of dentistry in the era of COVID-19 pandemic, “Step-by-step” approach

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Abstract

Introduction: The COVID-19 pandemic has a great impact on all aspects of higher education worldwide. In Iran, after several months of lockdown, all dental schools coped with the challenge of “reopening.” School of Dentistry of Tehran University of Medical Sciences (TUMS) planned to facilitate the process of reopening using a “step-by-step” approach. The aim of this study was sharing our experiences of reopening of the school during the pandemic.

Methods: TUMS School of Dentistry planned a “step-by-step” approach of reopening of school to both provide infrastructure of online education for theoretical credits and reassure all staff and students about infection control for practical courses. Also, a two-section survey on students’ satisfaction with a variety of aspects of reopening process and the clinical performance of students in different clinical courses was conducted.

Results: Findings showed 65.1% of the students, attended the survey, were satisfied with reopening of the school. Also, 86.4% were satisfied with the new online method of education for theoretical courses. Regarding personal protective equipment (PPE) provided for the students, 22.9% and 56.5% of them were satisfied and moderately satisfied, respectively. Additionally, 78.2% of the students were satisfied with the newly developed online assessment method.

Conclusion: Although reopening of schools during COVID-19 pandemic seems enigmatic for all authorities and students, the “step-by-step” plan designed by TUMS School of dentistry including emotional and infrastructural prerequisites might be a reliable method for all people, who are in charge of management of dental school in uncertain crisis.

KEYWORDS

COVID-19, education, dental, pandemics, school dentistry

1 | INTRODUCTION

A novel type of pneumonia was reported in December 2019 in China. The virus that caused the disease was named "SARS Cov-2," and the disease was named as COVID-19. In short time, the disease spread worldwide and become a global concern. COVID-19 has affected all aspects of life, and dental education is not an exception.¹ The Centers for Disease Control and Prevention (CDC) and American Dental Association (ADA) in April 2020 advocated dentists to limit dental activities to urgent and emergency cases.^{2,3} Subsequently, most dental schools and research centres around the world were shut down. This new situation encouraged dental schools to use online learning as an alternative to keep on the learning progress. Theatrical courses were the easiest part of education to be presented online. All the lectures switched to pre-recorded and live classes in different platforms like Zoom, google meeting and Skype. For laboratory courses, recorded video for demonstration, virtual reality and augmented reality were alternative methods. The most challenging part of dental education was clinical training, which is also the most important part.⁴

As the pandemic continued, a new challenge was emerged to strike a balance between protecting the health of students, staff and faculty members and continuing dental education. After months of closure, some higher education institutions reopened the faculties, and on 31 December 2020, the CDC announced the latest guidelines for reopening higher education institutions, in which institutions were divided into five categories: lowest risk, some risk, medium risk, higher risk and highest risk.⁵

In Iran, after the report of the first officially confirmed case of COVID-19 in February 2020, the higher education system was advised to prioritise the students and staff's safety by ceasing all face-to-face classes and activities. Shortly afterwards, a national workforce was established to provide updated guidelines for dental professions. This workforce consisted of the Secretary of Dental Affairs at the Ministry of Health and Medical Education (MoHME), representatives from the Iranian Dental Association and the deans of two major dental schools. Whilst observing all guidelines were mandatory after the national workforce approval, the universities were still permitted to adapt them to local circumstances. At Tehran University of Medical Sciences (TUMS), the Management Board of the School of Dentistry (SoD-MB) (including Dean and all Vice-Deans) was in charge of the implementation of the guidelines, authorised by the national workforce. In April 2020, after rather subsidence of COVID-19 outbreak, the national workforce at the MoHME mandated all schools of dentistry to reopen their clinical courses. In such situation, without a clear and predictable future of the pandemic in Iran, the SoD-MB decided to reopen the school in a step-by-step approach, strictly following the personal protective equipment (PPE) protocol to avoid transmission of COVID-19 infection in preclinical and clinical courses.^{6,7}

The purpose of this study was to describe the step-by-step approach taken by the school of dentistry at TUMS, Iran, regarding the reopening of undergraduate dental education, providing the

students' perspectives in the new conditions of education and comparing students' performance in online examinations with previous face-to-face examinations. We believe that careful planning by educational leadership is critical for the reopening and continuing of dental education, and we hope that the findings of this paper will be useful for other schools of dentistry facing similar challenges during the pandemic.

2 | METHODS

The undergraduate dental curriculum in Iran is a 6-year educational programme comprising of a two-year basic science and four-year pre-clinic and clinical dental education. TUMS offers the undergraduate dental programme in its national and international campuses. For this report, we enrolled all students in both campuses of the school of dentistry at TUMS. Ethical approval for this study was granted by TUMS ethical committee (IR.TUMS.DENTISTRY.REC.1399.233).

2.1 | Opening the school of dentistry step-by-step

Due to the need to reduce the number of students, patients and faculty members in the department and to observe the social distance, the academic timetable changes and practical courses of students in different years were presented in a step-by-step manner. First, it was planned for last-year students to complete their remaining courses in 3 weeks; the hospital course was converted to a cardiopulmonary resuscitation (CPR) workshop. None of the students was obligated for attendance, and they had the opportunity to postpone their semester. The students were divided to small groups in order to have less gathering in each department. Decreasing the number of students in each department needs extended time of practical courses in each day to make it possible for all students to complete their course in time.

Prior to the reopening of the university, staff and students were briefed on the need for standard precaution for the contact and airborne infection, including the use of PPE and hand hygiene protocols.⁸ To protect the skin and mucosa against the infected secretions, long-sleeved disposable isolation gowns, surgical gloves, N95 mask, safety glasses and full-face shield were given to students and involved faculties.⁷ Moreover, students were advised to wash their hands prior to the patient examination, prior to the initiation of a dental procedure, after contact with the patient and after touching the non-disinfected equipment and instrument.⁹ Students practised four-handed dentistry in restorative, endodontics, paediatrics, surgery and prosthetics departments.

A standard protocol was prepared and accepted for admission of patients, including taking a complete history related to COVID-19,¹⁰ checking the body temperature and O₂ saturation. Patients had to wear a mask upon arrival and keep the social distance (6 feet). This protocol was also implemented for all students, academic staff and office staff to enter the school of dentistry.

2.2 | Emotional support of students

At the beginning of the pandemic, all students were asked to stay at home. The vast majority of students were worried about their health in case of starting the clinical courses, and thus, rigorously advocated closure of the school to protect themselves against COVID-19 transmission and the unprecedented challenges. During that time, the vice dean for educational arranged online groups using most popular applications (WhatsApp and Telegram) to gather students from all years and shared details of decisions made by the SoD-MB and ICC to reassure the students about their safety after school reopening. Moreover, representatives from all years were invited to an online student committee (SC) to collaborate with SoD-MB in the urgent decision-making process. They were additionally supposed to dynamically be in touch with their classmates to facilitate the implementation of the decisions.

2.3 | Development of online education for theoretical courses

In COVID-19 pandemic, as it was necessary to cancel in-person classes, all faculty members were motivated to quickly switch their classes to a national online platform entitled "NAVID". To expedite the online educational process, an independent committee was created in the school of dentistry under the direct supervision of the TUMS virtual school. First, the committee invited junior well-experienced faculty members in each department, and second, asked them to organise online teaching groups to train all faculties. Additionally, several online workshops were held to respond professor's common questions on "how to record an educational video?" or "how to upload the educational materials in NAVID website?" and to troubleshoot their technical problems. A questionnaire was designed to ensure that all students had access to laptops and the internet.

The faculty members were given the opportunity to gradually load the educational content along with the task for summative assessment. Videos and educational demonstrations of pre-clinic courses were uploaded on NAVID for the purpose of blended training. Moreover, communication between students and faculties was feasible in NAVID. In addition, WhatsApp support group of online courses was formed to facilitate communications and solve possible problems.

2.4 | Preclinical/ Practical courses

For preclinical courses, videos and multimedia were provided and uploaded in NAVID. Besides this e-learning, it was still needed that the students practice with head phantom and simulation models. Students were divided into small groups (10–12 person in each group), and the in-person preclinical courses were presented four

times in the semester in order for the least number of students to be present in the pre-clinic at any time. Similar to the pre-clinic courses, the presence of the minimum number of students was planned for the clinic. The students were informed that they could complete their requirement within the next two semesters.

2.5 | Development of online assessment

Moving from a conventional assessment method to an online method was definitely the most challenging issue in the educational system during the pandemic, mandated many formal and informal meetings with ICC and SC to convince both faculties and students about the advantages of this assessment method. At the first step, several pilot assessments were conducted to elucidate technical problems and also to guarantee the security of the examinations as much as possible. At the second step, 78 theoretical examinations were officially held and all feedback from faculty members and students was meticulously evaluated to revise the executive procedure of online assessments. The results of the online examinations were compared with the equivalent face-to-face examination held last year. Independent sample test was used to compare the mean of online and in-person examinations. Mean, standard deviation and presence of failed students were reported. All statistical analysis was performed using a statistical software (IBM SPSS Statistics v25; IBM Corp).

We designed a questionnaire that consisted of two parts (Figure S1). The first part focussed on students' satisfaction with a variety of aspects, including the reopening process, online classes, online examinations and the incidence of getting COVID-19 infection whilst attending the school of dentistry. The second part of the questionnaire focussed on the clinical performance of students in different courses and their satisfaction with 4-hand dentistry. At the end of semester, we sent out the questionnaire to all students of years 3, 4 and 5 (330 students) through a Google form link. Students were assured that their answers would be anonymous and participation was not mandatory. After completion of the survey, we extracted the answers and used descriptive statistics for reporting the distribution of responses.

3 | RESULTS

The summary of steps for reopening the dental school is presented in Figure 1. In the first semester after reopening, all students attended the clinical courses. A total of 2781 educational content related to undergraduate students, in the form of Sharable Content Object Reference Model (SCORM), streamed videos, PPT with a recorded voice, or pdf documents, was prepared and uploaded on NAVID. Also, 1631 assignments were uploaded for formative assessment and 6241 feedbacks were given to the students.

A total of 236 students completed the survey (71.5% of students). A total of 65.1% ($n = 153$) were generally satisfied with

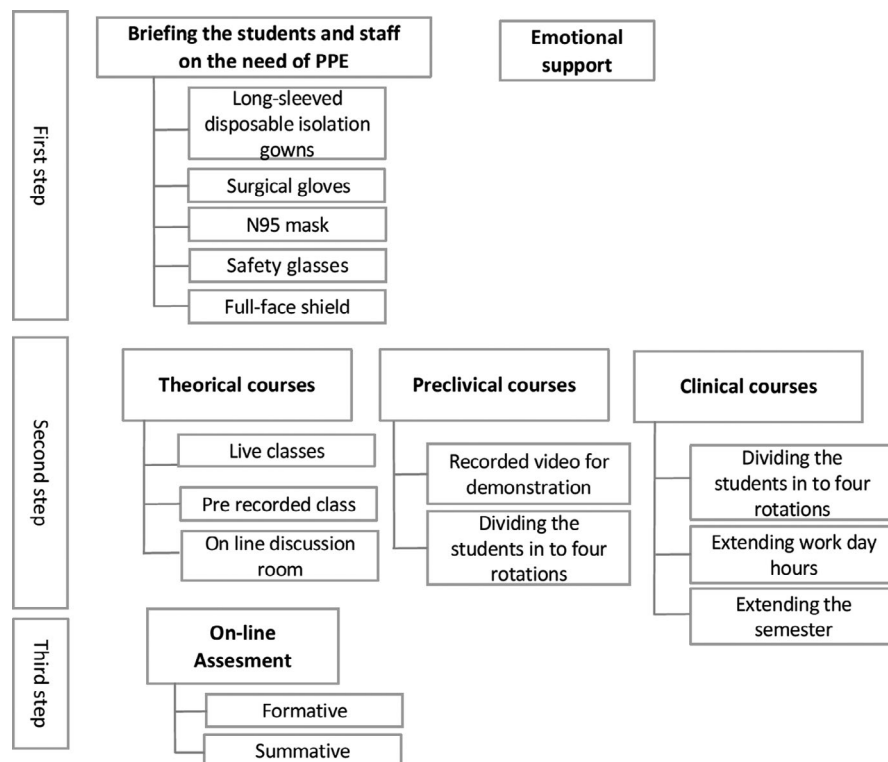


FIGURE 1 Steps of reopening of the school

Question	Yes Per cent (N)	No Per cent (N)
Are you generally satisfied with the reopening of the school of dentistry?	65.1% (153)	39.4% (82)
Do you find online classes useful compared with face-to-face classes?	86.4% (203)	13.6% (32)
Would you like to have online classes even after the end of pandemic?	86.4% (203)	13.6% (32)
Do you find online examinations a good method of assessment?	22% (49)	78% (173)
Would you like to have online examinations even after the end of pandemic?	78.2% (183)	21.8% (51)

TABLE 1 Students' perspectives regarding the reopening of school of dentistry

reopening of the school of dentistry. Regarding the online classes, 86.4% ($n = 203$) of students were satisfied with the new method of education for theoretical content and agreed to hold the classes online even after the end of pandemic. 22.9% ($n = 54$) and 56.5% ($n = 133$) of students were satisfied and moderately satisfied, respectively, with the provided PPE. In assessing the online examinations, 78.2% ($n = 183$) of students stated that they preferred online examination (Table 1).

In analysing students' clinical performance, the results showed that the highest rate of fulfilling the requirement was related to the radiology department whilst in 5 disciplines none of the students could complete the requirement (Table 2).

Comparing the results of online and in-person examinations of theoretical subjects, results showed an increase in mean score in some courses compared with the previous year, to no significant differences or even decreasing the mean score (Table 3).

4 | DISCUSSION

Due to the ongoing COVID-19 pandemic and uncertainty of when it will end, students' requests for opening the college increased after three months of closure. Last-year students were more inclined for reopening of the university as some of them had to graduate before taking the specialty examination. Also, second-year students had to take a comprehensive basic science examination to enter preclinical courses. Other students were concerned about incomplete courses and patients with incomplete treatment. According to the survey, 47.5% of undergraduate students wanted the school of dentistry to reopen. On the contrary, oral diseases will not resolve if left untreated and can progress to more severe stages. Pain from untreated oral diseases can lead to an urgent situation. In advanced states, caries involves the pulp of the tooth and destroys tooth structure leaving only root fragments that can lead to ulcerations, abscesses, swelling and

TABLE 2 Rate of fulfilment of the requirements in clinical courses

	Fulfilment of the whole requirement (N)	Fulfilment of more than 50% of requirement (N)	Fulfilment of less than 50% of requirement (N)
Radiology	41.9% (18)	38.6% (17)	16.4% (7)
Complete denture	7% (3)	62.8% (27)	27.9% (12)
Restorative dentistry 1	0%	0%	100% (43)
Restorative dentistry 2	3.8% (3)	88.9% (71)	7.5% (6)
Dental surgery 1	0%	0%	100% (114)
Dental surgery 2	21.3% (17)	47.6% (38)	30.1% (24)
Endodontics 1	0%	0%	100% (112)
Endodontics 2	0%	0%	100% (79)
Partial denture	12.3% (14)	19.3% (22)	68.5% (78)
Oral disease	0%	3.5% (4)	96.5% (110)
Fixed prosthesis	16.3% (13)	55% (44)	26.3% (21)
periodontology	1.3% (1)	11.3% (9)	87.6% (70)
paediatrics	16.3% (13)	48.9% (39)	32.6% (26)

TABLE 3 Comparison of the result of online and in-person examinations

Course	Mean (SD)-online examination	Mean (SD)-traditional examination	p-value of comparing scores	Failed students—online examination	Failed students—traditional examination
Endodontics	16.75 (1.57)	15.6526 (1.98)	.000 ^a	0	3.89
Periodontology	16.84 (1.41)	15.42 (1.34)	.000 ^a	0	0
Restorative dentistry	15.52 (1.25)	15.03 (1.53)	.058	0	3.27
Oral disease 1	15.72(2.53)	14.05 (2.50)	.000 ^a	5.40	10.44
Oral disease 2	16.48 (0.93)	16.04 (1.42)	.047 ^a	0	0
Oral surgery	17.47 (1.04)	15.95 (1.77)	.000 ^a	0	1.53
Geriatric dentistry	17.85(1.02)	15.51 (2.44)	.000 ^a	0	0
Systemic disease	16.61 (1.86)	14.88 (1.90)	.000 ^a	3.12	7.89
Treatment for edentulous patients	14.78 (2.63)	14.52(1.98)	.540	9.83	8.47
Dental material	14.95 (2.21)	12.99 (2.63)	.000 ^a	8.86	31.34
Fixed prosthesis	14.2681 (2.03)	15.1044(2.12)	.009 ^a	10.44	5.88
Radiology	15.3698 (1.73)	15.7204 (2.07)	.289	0	4
Paediatrics	15.0000 (1.54)	15.9366 (1.66)	.001 ^a	0	1.40

^ap-value is significant (less than 0.05).

pain and ultimately lead to tooth loss.⁷ All of these issues lead to the decision of reopening the school of dentistry in a step-by-step manner.

This pandemic has led to exchange educational models and fast implementation of new ways to continue educational content distantly.¹¹ In the recent decade, the Iranian universities have been encouraged to deliver twenty per cent of each educational credit online. However, this per cent changed to hundred for theoretical courses during COVID-19 pandemic. Alternative models of didactic education in North American, European and Asian dental schools were live and pre-recorded online lectures and virtual problem-solving activities; however, limited access to high-speed internet, faculty not being “tech-friendly,” faculty lacking training with online

class set-ups and internet disconnections were reported problems for online classes especially in Asia.¹¹

In our dental school majority of students stated that the online classes were more useful than face-to-face classes and wanted the classes to continue to be held online even after the end of the pandemic. Advantages of online learning consist of accessibility to higher number of audience, flexible and easy administration of educational content due to personal choice of time and location of the class, provoking the students to become self-directed learners.¹² Besides these benefits, we should be careful about collaborative learning, discussion and the lower quality of interaction between students and faculty members in online classes.¹³

The strategies for online assessment in TUMS consisted of both summative and formative methods. The online tools for formative assessment, consisting self-test quizzes and assignments, aimed to enhance learner engagement. The advantages of online summative assessment include costs saving for printing papers, use of freely available online tools with flexible time, possibility to hold an examination for a large number of students at one time, which may not be possible in the face-to-face examination due to limited space and staff. This is whilst, the disadvantages of online assessment include software costs, increased possibility of cheating and uncertain reliability of the examination. To minimise the possibility of cheating, questions were randomly selected for each student; moreover, the order of options in multiple-choice questions was random. The implanted methods for decreasing the probability of cheating during the online examinations were using faculty-monitored webcams, lockdown browsers that blocked students from opening other applications during the examination and using proctoring services from third-party companies.¹¹

The analysis showed that in some courses, the mean score of online examination increased compared with the previous year to no significant differences or even decreasing the mean score. This could indicate that despite the online nature of the examinations, the average and deviation of scores are still within an acceptable range compared with face-to-face examinations. The only noteworthy point in analysing the result of examinations is the decrease in the percentage of failed students compared with the previous year in all courses except "treatment of edentulous patients" and "fixed prosthodontics."

According to the experience gained, Tehran School of Dentistry suggests a mix of online and face-to-face classes for didactic education in order to benefit from advantages of both methods. In clinical courses, as virtual simulation cannot replace treating the real patient, it is suggested to divide the students into two parts for the next semesters and all preclinical and clinical courses be presented twice. Moreover, the authors suggest extending the duration of semester and daily working hours. With this method, in addition to observing the social distance and reducing the number of students in the dormitory, the probability of completing requirement increases.

5 | CONCLUSION

Although the coronavirus pandemic posed major problems in dental education and research, it provided us with an opportunity to use new digital facilities and technologies in dental education and assessment, as well as to upgrade online distance learning platforms. However, new work-life trends can affect the quality of life, due to the increased volume of online classes, emails and online meetings which require a constant online presence that can make it difficult to delineate the daily time for education and life.

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CONFLICT OF INTEREST

The authors have nothing to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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